



Incremental Reasoning on RDFS

Jules Chevalier, Julien Subercaze, Christophe Gravier, Frederique Laforest

► To cite this version:

Jules Chevalier, Julien Subercaze, Christophe Gravier, Frederique Laforest. Incremental Reasoning on RDFS. The Fourteenth International Symposium on Intelligent Data Analysis, Oct 2015, Saint Etienne, France. hal-01261407

HAL Id: hal-01261407

<https://hal.science/hal-01261407>

Submitted on 25 Jan 2016

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

INCREMENTAL REASONING ON RDFS

JULES CHEVALIER, JULIEN SUBERCAZE, CHRISTOPHE GRAVIER, FRÉDÉRIQUE LAFOREST

UNIVERSITÉ DE LYON, F-42023, SAINT-ETIENNE, FRANCE,

CNRS, UMR5516, LABORATOIRE HUBERT CURIEN, F-42000, SAINT-ETIENNE, FRANCE,

UNIVERSITÉ DE SAINT-ETIENNE, JEAN MONNET, F-42000, SAINT-ETIENNE, FRANCE.

{JULES.CHEVALIER,JULIEN.SUBERCAZE,CHRISTOPHE.GRAVIER,FREDERIQUE.LAFOREST}@UNIV-ST-ETIENNE.FR

CONTEXT

The Semantic Web enables to:

- describe knowledge from data
- leverage implicit knowledge through reasoning algorithms

The main limitations of current reasoning methods are:

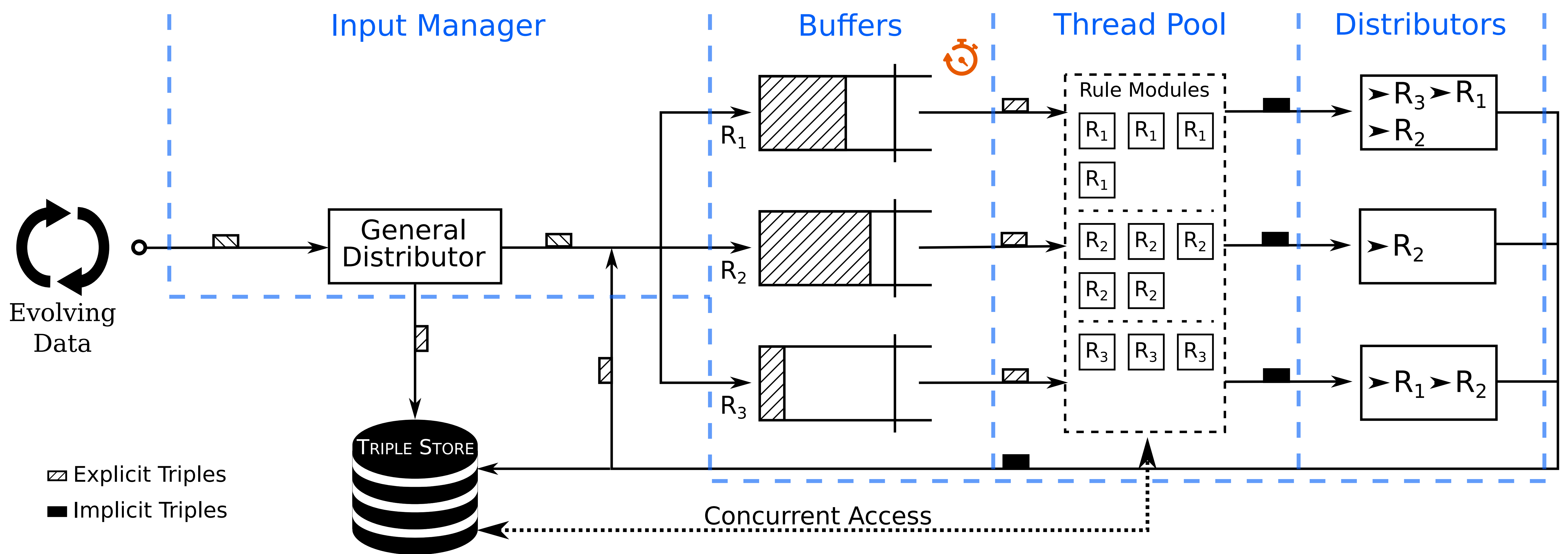
- lack of scalability for large datasets
- inability to reason over knowledge from evolving data

We contribute to solving these problems by introducing Slider, an efficient incremental reasoner.

MAIN FEATURES

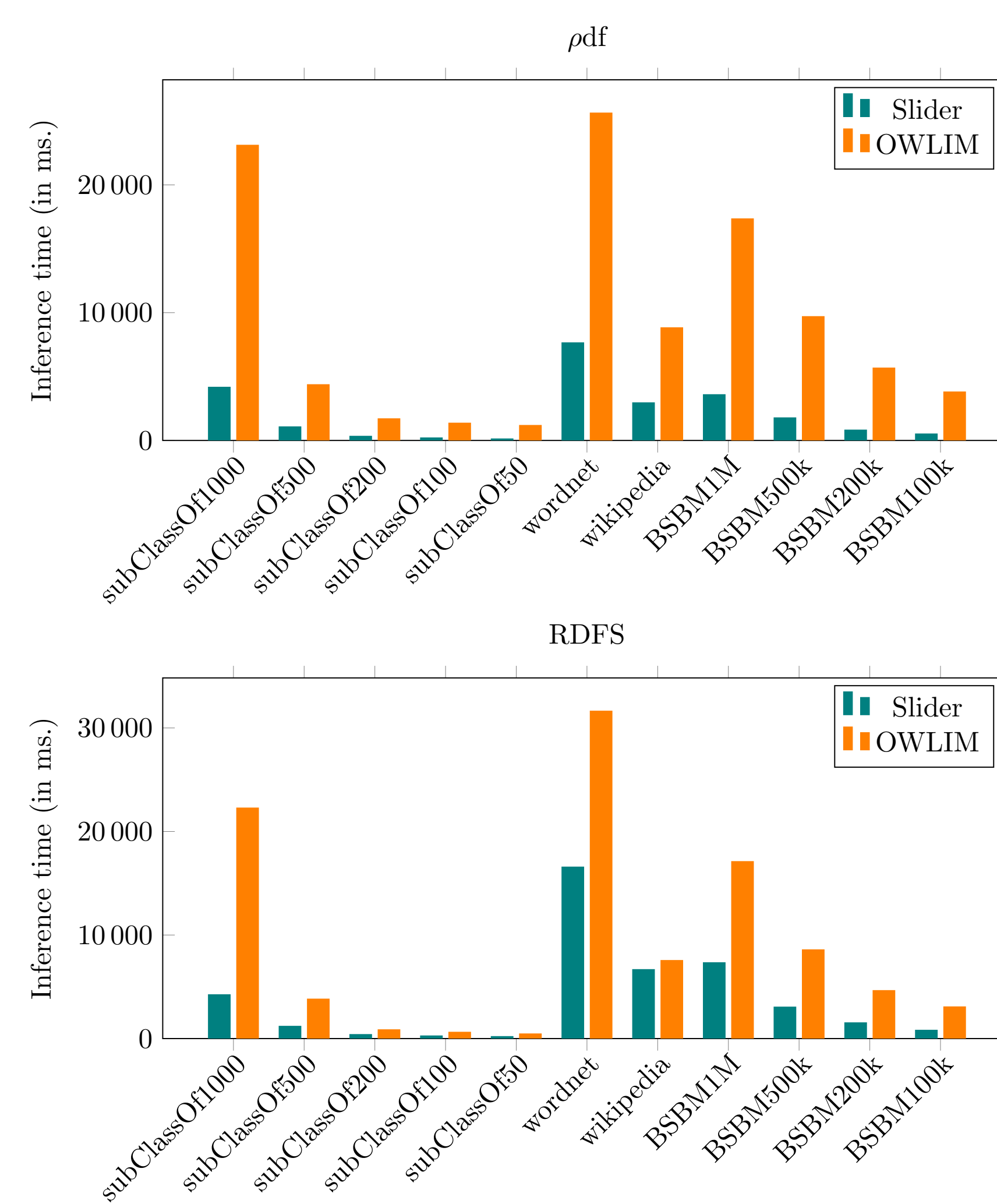
- **Parallel and Scalable Execution:** Each inference rule is mapped to an independent module, receiving intended triples and later distributing them to other modules for further processing.
- **Duplicates Limitation:** Vertical partitioning [1] and multiple indexing limit the production of duplicates and avoid unnecessary computation.
- **Data Stream Support:** Slider can handle both dynamic triple streams and static triples sets by employing parallel architecture.
- **Fragment's Customization:** Slider natively support both RDFS [4] and ρ df [5] fragments, and can be extended to any other fragments.

ARCHITECTURAL OVERVIEW



EXPERIMENTATIONS

- Comparison with OWLIM-SE [2]
- Inference on both RDFS and ρ df
- 13 different ontologies
 - 5 generated with BSBM [3]
 - 2 from real-world datasets
 - 6 subClassOf ontologies
- **106.86%** improvement for ρ df
- **36.08%** improvement for RDFS
- **71.47%** improvement in average



FUTURE WORK

- Implementation of more complex inference rules, to provide reasoning over more complex fragments.
- Just-in-time optimisations of the rules execution's scheduling.
- Use of previous runs informations to adapt and be more reactive.

SOURCE CODE AND DEMO

The source code is available here:

<https://github.com/juleschevalier/slider>

A demo can be found here:

<http://demo-satin.telecom-st-etienne.fr/slider/>

ACKNOWLEDGEMENT

This work is supported by the OpenCloudware project. OpenCloudware is funded by the French FSN (Fond national pour la Société Numérique), and is supported by Pôles Minalogic, Systematic and SCS.

REFERENCES

- [1] D. J. Abadi, A. Marcus, S. R. Madden, and K. Hollenbach. Scalable Semantic Web Data Management Using Vertical Partitioning. In *PVLDB*, 2007.
- [2] B. Bishop, A. Kiryakov, D. Ognianoff, I. Peikov, Z. Tashev, and R. Velkov. OWLIM: A Family of Scalable Semantic Repositories. *Semantic Web*, 2011.
- [3] C. Bizer and A. Schultz. The berlin sparql benchmark. *IJSWIS*, 2009.
- [4] D. Brickley and R. V. Guha. RDF vocabulary description language 1.0: RDF schema. 2004.
- [5] S. Munoz, J. Pérez, and C. Gutierrez. Minimal deductive systems for RDF. In *The Semantic Web: Research and Applications*. 2007.